Spring Valley
Disaster 4116 - IL
FEMA Assistance
LDG Summary
April, 2014

		Clarifier/Grit		Lagoon/Levee		Headworks repair		Plant Building		Hazard Mitigation/Berm		Total
Part		Cost	Pct used	Cost	Pct used	Cost	Pct used	Cost	Pct used	Cost	Pct used	Cost
A	Permanent Work	124,374		19,010		52,913		725,873		737,400		1,659,570
	Non permanent							7,207				7,207
	Subtotal	124,374		19,010		52,913		733,080		737,400		1,666,777
B	General Conditions							31,156	4.25%	31,340	4.25%	62,496
D	OH and profit							254,285	34.69%	110,610	15.00%	364,895
A + B + D	Subtotal	**$ 124,374**		**$ 19,010**		**$ 52,913**		**$ 1,018,521**		**$ 879,350**		**$ 2,094,167**
E	Escalation allowance	2,298	1.85%	351	1.85%		1.85%	18,843	1.85%	16,268	1.85%	37,760
F	Construction Permit									1,500		1,500
G	Reserve for construction	6,219	5.00%	950	5.00%			50,926	5.00%	43,967	5.00%	102,063
H	Proj Mgt-Design phase	1,244	1.00%	190	1.00%	529	1.00%	9,802	0.96%	8,793	1.00%	20,558
	Design	3,800	3.06%	570	3.00%			109,108	10.71%	70,348	8.00%	183,826
	Proj Mgt-Construction phase	7,600	6.11%	1,521	8.00%	529	1.00%	40,091	3.94%	70,348	8.00%	120,089
	Total	**$ 145,534**		**$ 22,592**		**$ 53,971**		**$ 1,247,291**		**$ 1,090,574**		**$ 2,559,963**
												75.00%
												$ 1,919,972

CITY OF SPRING VALLEY, ILLINOIS

WASTEWATER FACILITIES PLAN

PROPOSED WASTEWATER TREATMENT PLANT IMPROVEMENTS

FEBRUARY, 2014

ADDENDUM
AUGUST, 2014

PREPARED BY CHAMLIN & ASSOCIATES, INC.
PERU MORRIS ILLINOIS

TABLE OF CONTENTS

CITY OF SPRING VALLEY, ILLINOIS
WASTEWATER FACILITIES PLAN PROPOSED
WASTEWATER COLLECTION AND TREATMENT
PLANT IMPROVEMENTS
FEBRUARY, 2014 ADDENDUM -
AUGUST, 2014

1. EXECUTIVE SUMMARY

The City of Spring Valley's existing wastewater treatment facilities have proven unreliable to prevent violations of their NPDES discharge standards. In April of 2013, the plant was inundated in Illinois River flooding, suffering extensive damage. That same month, the City was delivered a Consent Order to achieve compliance by 2018. The following Facilities Plan is a submittal proposing to completely replace their existing facilities with a new mechanical plant designed for a daily average flow of 0.8 MGD and including biological nutrient removal capabilities. **The existing lagoon will be converted to an excess storm water / equalization lagoon.** The Plan provides for a new plant start-up in March, 2017. Due to receipt of a State grant and Flood Disaster Assistance, no increase of user rates will be required to facilitate funding of this project or its resulting operation and maintenance costs.

2. WASTEWATER TREATMENT PLANT ALTERNATIVES CONSIDERED

Five (5) different alternative wastewater treatment systems were considered:

Alternative 1 -- Upgrade Existing Primary Treatment/Lagoon Facilities.

Alternative 2 -- Conventional Activated Sludge Treatment Plant.

Alternative 3 -- Aeromod Modular Activated Sludge Treatment Plant.

Alternative 4 -- Sequencing Batch Reactors.

Alternative 5 -- Oxidation Ditch.

As discussed above, the projected maximum daily flow into the wastewater treatment plant is 10.0 MGD. This compared to the DAF of 0.65 MGD yields a DMF/DAF ratio of 15.4:1. Based on the peak flow of 13,900 gpm, that ratio becomes 30.8:1. Clearly, equalization should be considered. To achieve equalization and to allow for storm water capture and treatment, the north end of the existing lagoon could be converted to an

equalization/excess storm water storage basin. This area of the lagoon can provide storage for up to approximately 17 MG of sanitary wastewater and excess storm flow, which would accommodate the 12.78 MG of excess flow predicted in a 10-year 24-hour storm event. **It is also possible to utilize the entire 67 MG volume of the existing lagoon for storm detention/equalization. Equalization can be provided by either all or a portion of the existing lagoon.**

Given considerable opportunity for equalization even through a normal daily diurnal cycle, it is proposed to set the DMF at 2.2 MGD or 2.75 times the DAF with all flow exceeding this amount diverted through equalization.

3. EXISTING LAGOON USAGE ALTERNATIVES CONSIDERED

Option 1: **Dike Off Lagoon North End, Remove Solids, Demolish South End of Lagoon**

The north end of the existing lagoon could be diked off (see Exhibit 8) and thereafter drained. Any sludge solids remaining in this containment area will be transferred to the south end of the lagoon. It is estimated there may be as much as 20,000 cubic yards (CY) of solids within this area. The south end of the existing lagoon would be kept in operation until the new plant is completely operational.

Once the new plant is on-line, the south lagoon would be drained by pumping its supernatant back to the headworks of the new plant or, if that supernatant is in compliance with the NPDES permit, it may be disinfected and discharged through the permitted outfall.

Once the supernatant has been removed, a sump/pumping arrangement will be installed to pump any remaining drainage to the new north end equalization basin and from thence back to the headworks of the new wastewater treatment plant. The sump will capture any remaining free water which drains off the solids and will also continuously remove any captured storm water. The solids may be furrowed to encourage drainage and, if necessary, a center ditch may be cut to encourage drainage toward the sump. It is currently estimated there is a total of

67,000 CY of solids in the south lagoon. With the addition of the 20,000 CY from the original north end, there will be 87,000 CY of solids to be dealt with.

Once it is determined the solids have been dewatered as much as possible in place, the solids will be physically removed, dewatered, and then transferred to a landfill. As of the writing of the Facility Plan, not much test data is available on the composition of the solids. However, some testing has indicated metals levels

too high to allow a 503 land application disposal. For purposes of cost estimating, it is assumed the sludge will need to be landfilled.

Once the solids have been removed, the south end dikes will be demolished and the soils transferred to be used as fill around the new wastewater treatment plant. The south end facilities will be demolished and the entire area top-soiled and seeded.

The construction cost to dike off the lagoon's north end and provide for that area a new aeration system, to provide start-up transition pumping and piping, south end demolition, and landfilling of the sludge solids is estimated to be $5,491,875. The total cost (including engineering, administration, and legal expenses) of this option would be $6,167,376.

Option 2: **Convert Entire Existing Lagoon to Excess Storm Flow/Equalization**

Under this option, **the entire existing lagoon will be converted to excess storm flow and equalization. It is proposed to replace the existing aeration system with a system of floating aerator/mixer units (see Exhibit 9) to ensure odor control and to provide some degree of mixing. This option has the advantage of providing very large excess storm flow storage capability. Under Option 1, system modeling indicates sufficient volume to store up to a 10-year/24-hour storm. However, it is understood by all that considerably larger storms are possible. Option 2 provides sufficient capacity that even cataclysmic storm events could be captured and the wastewater treatment plant facilities protected.**

Under this option, all captured excess flows will eventually be returned to the head of the proposed wastewater treatment plant. Records indicate a typical total excess flow of about 50 MG/year. This total could be captured in the 67 MG lagoon. However, after a storm event, the plan will be to begin returning excess flows to the head of the wastewater treatment plant as soon as influent flows return to more reasonable volumes. Over the course of a year, the difference between the plant's capacity of 2.2 MGD and the average of 0.8 MGD (= 1.4 MGD) would amount to a total excess capacity of over 500 MG. This capacity can then easily accommodate the typical 50 MG/year of excess flow.

Since all captured flows will be returned to the head of the wastewater treatment plant, the south end facilities will no longer be necessary and hence will be demolished.

The construction cost to remove the existing lagoon aeration system, to replace it with a new floating aerator/mixer system, and to demolish the south end facilities is estimated at $954,375. The total cost (including

engineering, administration, and legal expenses) of this option would be $1,071,760.

During detailed design, other possible aeration/mixer systems will be considered and compared to the proposed floating aerator/mixer units, and less expensive alternatives may be proposed.

A detailed estimate of these options is included in Appendix E. The costs associated with Option 2 are included in the total construction costs of each alternative treatment system considered.

4. PROJECT COSTS

The construction and non-construction costs of the evaluated alternatives are presented in the following table. Detailed cost estimates are provided in Appendices C and E.

	ALTERNATIVE 2 (Conventional Activated Sludge Plant)	ALTERNATIVE 3 (Aeromod Modular Activated Sludge Plant)	ALTERNATIVE 4 (Sequencing Batch Reactors)	ALTERNATIVE 5 (Oxidation Ditch)
Total Construction Cost	$ 9,353,700	$ 8,868,600	$ 9,284,900	$ 9,452,900
10% Contingency	935,400	886,900	928,500	945,300
Non-Construction Costs:				
Engineering Design	593,300	564,500	589,200	599,200
Construction Observation	617,300	585,300	612,800	623,900
North End Asbestos Abatement	17,500	17,500	17,500	17,500
North End Demolition	35,000	35,000	35,000	35,000
Admin-Legal	51,400	48,800	51,100	52,000
Total Project Cost	**$ 11,603,700**	**$ 11,000,000**	**$ 11,519,000**	**$ 11,725,800**

5. RECOMMENDED PROJECT

The recommended project is Alternative 3 - a 0.8 MGD Aeromod Modular Activated Sludge Plant with nutrient removal capabilities. The Aeromod plant construction and operating costs (including nutrient removal) are the lowest of the four alternatives seriously considered. Although nutrient removal is not strictly required at this time, the additional cost to include it is relatively small. The technology package also allows for more efficient aeration, which will allow for some operational cost savings even without intentional nutrient removal.

With regard to the existing lagoon, Option 2: Convert Entire Existing Lagoon to Excess Storm Flow/Equalization is the recommended option. The cost of this option is dramatically lower than the Dike Off Lagoon North End, Remove Solids, Demolish South End of Lagoon option, and is included in the above listed Project Costs.